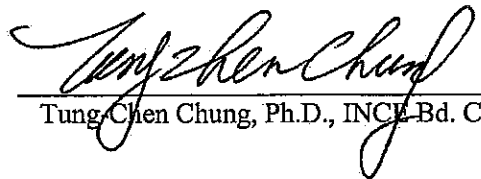


# NOISE IMPACT ANALYSIS

COUNTY OF SAN DIEGO TRACT NO. 5482 RPL<sup>3</sup>

FRANCES KNOLL

  
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LSA

December 2009

# NOISE IMPACT ANALYSIS

COUNTY OF SAN DIEGO TRACT NO. 5482 RPL 1  
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## TABLE OF CONTENTS

SUMMARY OF FINDINGS .....	1
INTRODUCTION.....	1
PROJECT DESCRIPTION .....	1
METHODOLOGY RELATED TO NOISE IMPACT ASSESSMENT .....	1
CHARACTERISTICS OF SOUND.....	4
MEASUREMENT OF SOUND.....	4
PSYCHOLOGICAL AND PHYSIOLOGICAL EFFECTS OF NOISE.....	5
SETTING .....	6
PROJECT IMPACTS.....	13
MITIGATION MEASURES.....	21
LEVEL OF SIGNIFICANCE AFTER MITIGATION .....	22
REFERENCES .....	22

## APPENDICES

- A: SOUND32 HIGHWAY TRAFFIC NOISE MODEL PRINTOUTS
- B. FHWA HIGHWAY TRAFFIC NOISE MODEL PRINTOUTS

## FIGURES AND TABLES

### FIGURES

Figure 1: Project Location Map .....	2
Figure 2: Site Plan.....	3
Figure 3: Recommended Temporary Construction Wall Locations.....	16
Figure 4: 60 dBA CNEL Contour Map.....	17
Figure 5: Noise Modeling Locations.....	19

### TABLES

Table A: Definitions of Acoustical Terms .....	7
Table B: Common Sound Levels and Their Noise Sources .....	8
Table C: Land Use Compatibility for Exterior Community Noise .....	9
Table D: Existing (2006) Peak Hour Traffic Noise Levels.....	10
Table E: Short-Term Ambient Noise Monitoring Results .....	10
Table F: Physical Location of Noise Level Measurements.....	10
Table G: Noise Abatement and Control for Determining Zonal Property Line Sound Level Limits ..	12
Table H: Typical Maximum Construction Equipment Noise Levels ( $L_{max}$ ) .....	14
Table I: Buildout Year (2030) Traffic Noise Levels.....	18
Table J: Future (2030) Traffic Noise Levels, $L_{eq}$ (dBA).....	20
Table K: Future Traffic Noise Levels, CNEL (dBA).....	20

## SUMMARY OF FINDINGS

This noise impact analysis has been prepared to evaluate the potential noise impacts and mitigation measures associated with the development of the Frances Knoll residential project on Tract No. 5482 RPL 1 in unincorporated San Diego County (County), California.

The primary existing noise sources in the project area are transportation facilities. Traffic on Hillsdale Road, Vista Grande Road, and other streets in the project vicinity is the source of ambient noise in the project vicinity.

Construction of the project will temporarily increase the ambient noise levels in the project vicinity. The proposed residential uses would not be exposed to traffic noise exceeding the County's exterior and/or interior noise standards.

The following mitigation measure is required during construction of the proposed project:

- Construction will be limited to the hours of 7:00 a.m. to 7:00 p.m. on any working day except Sundays and holidays, in accordance with the County Ordinance. No construction activities are permitted outside of these hours or on Sundays and holidays.
- A temporary construction barrier is required along the project's eastern, western, and southern boundaries where existing residences exist (see Figure 3 in Project Impacts section), with a minimum height of 8 feet.

## INTRODUCTION

This report is intended to satisfy the County's requirement for a project-specific noise impact analysis by examining the short-term and long-term impacts on the project site and by evaluating the effectiveness of mitigation measures incorporated as part of the project designs.

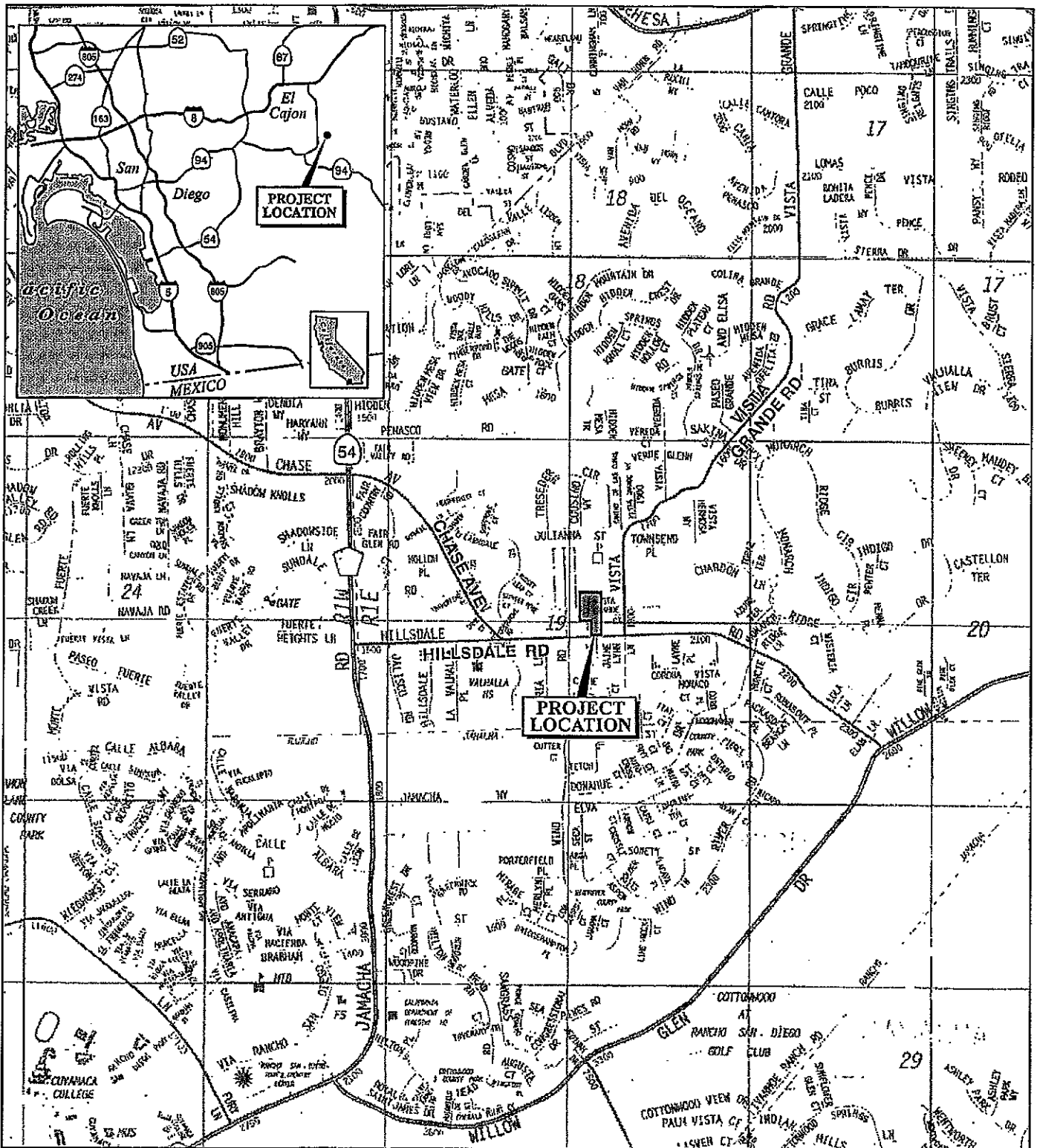
## PROJECT DESCRIPTION

The proposed project is located on a site north of Hillsdale Road and west of Vista Grande Road and includes the development of five rural estate single-family lots. The site is generally bounded by Hillsdale Road on the south and existing residential development on the east, west, and north. Figure 1 illustrates the location and vicinity of the proposed project. Figure 2 illustrates the project's site plan. As shown in Figure 2, the rural estate lots will be adjacent to and accessed from Hillsdale Road.

## METHODOLOGY RELATED TO NOISE IMPACT ASSESSMENT

Evaluation of noise impacts associated with the proposed project includes the following:

- Determine the noise impacts associated with short-term construction of the proposed project on adjacent noise-sensitive uses



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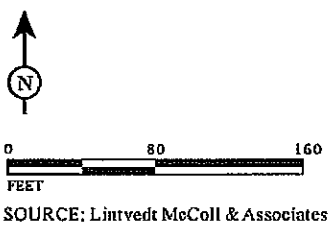
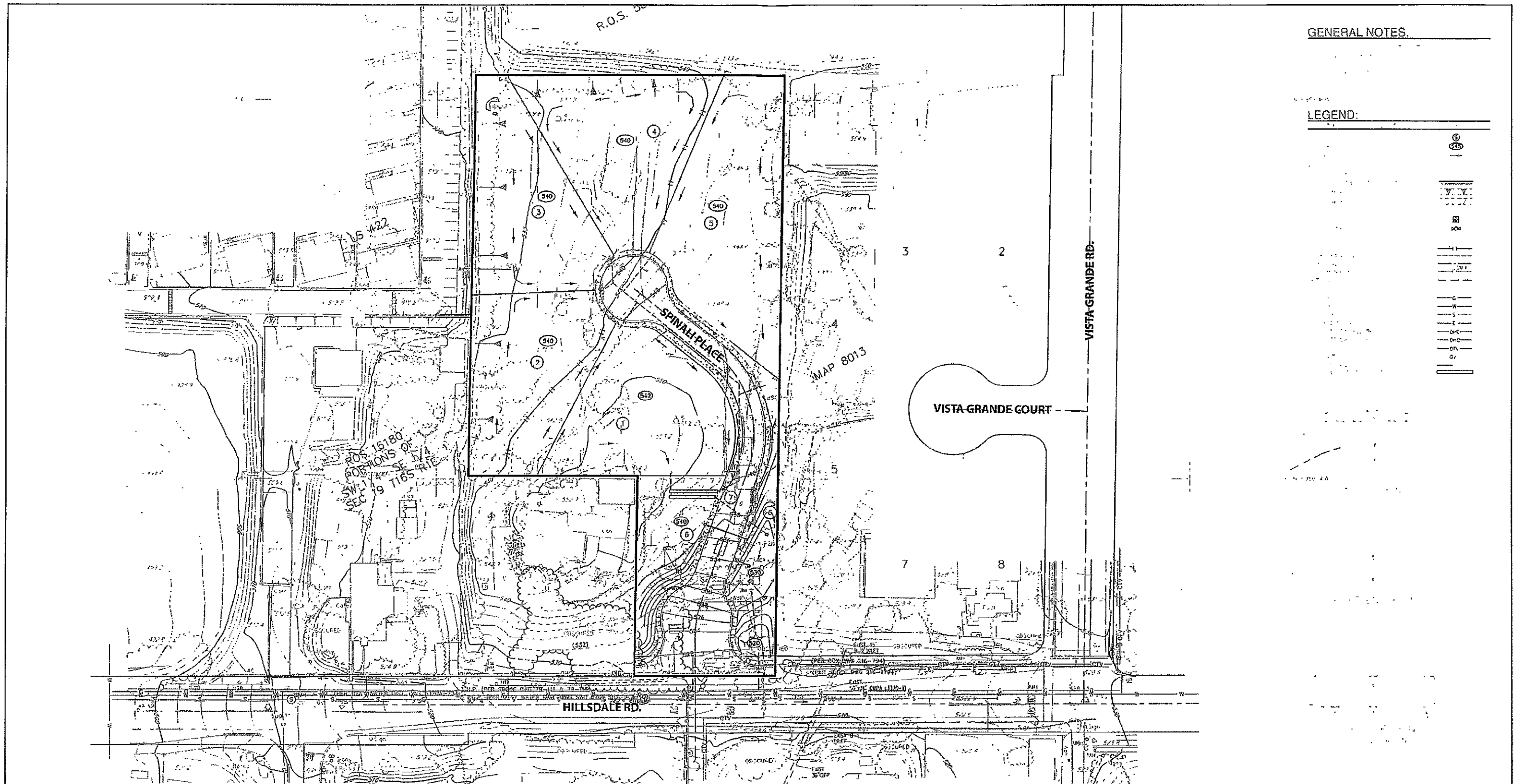
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SOURCE: The Thomas Guide, 2005

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FIGURE 1

Frances Knoll  
Project Location



Frances Knoll  
Site Plan

- Determine the long-term traffic noise impacts on noise-sensitive uses on site; and
- Determine the required mitigation measures to reduce short-term and long-term noise impacts

This noise impact analysis utilizes the County's noise standards, including the County's Noise Element and Noise Control Ordinance, as thresholds against which potential noise impacts are evaluated.

## CHARACTERISTICS OF SOUND

Sound is increasing in the environment and can affect quality of life. Noise is usually defined as unwanted sound. Noise consists of any sound that may produce physiological or psychological damage and/or interfere with communication, work, rest, recreation, and sleep.

To the human ear, sound has two significant characteristics: pitch and loudness. Pitch is generally an annoyance, while loudness can affect the ability to hear. Pitch is the number of complete vibrations, or cycles per second, of a wave, resulting in the tone's range from high to low. Loudness is the strength of a sound and describes a noisy or quiet environment; it is measured by the amplitude of the sound wave. Loudness is determined by the intensity of the sound waves, combined with the reception characteristics of the human ear. Sound intensity refers to how hard the sound wave strikes an object, which in turn produces the sound's effect. This characteristic of sound can be precisely measured with instruments. The analysis of a project defines the noise environment of the project area in terms of sound intensity and its effect on adjacent sensitive land uses.

## MEASUREMENT OF SOUND

Sound intensity is measured through the A-weighted scale to correct for the relative frequency response of the human ear. That is, an A-weighted noise level de-emphasizes low and very high frequencies of sound similar to the human ear's de-emphasis of these frequencies. Unlike linear units, such as inches or pounds, decibels are measured on a logarithmic scale representing points on a sharply rising curve.

For example, 10 decibels (dB) are 10 times more intense than 1 decibel, 20 decibels are 100 times more intense, and 30 decibels are 1,000 times more intense. Thirty decibels represent 1,000 times more acoustic energy than one decibel. The decibel scale increases as the square of the change, representing the sound pressure energy. A sound as soft as human breathing is about 10 times greater than 0 decibels. The decibel system of measuring sound gives a rough connection between the physical intensity of sound and its perceived loudness to the human ear. A 10-decibel increase in sound level is perceived by the human ear as only a doubling of the loudness of the sound. Ambient sounds generally range from 30 dBA (very quiet) to 100 dBA (very loud).

Sound levels are generated from a source, and their decibel level decreases as the distance from that source increases. Sound dissipates exponentially with distance from the noise source. For a single point source, sound levels decrease approximately six decibels for each doubling of distance from the source. This drop-off rate is appropriate for noise generated by stationary equipment. If noise is produced by a line source, such as highway traffic or railroad operations, the sound decreases three decibels for each doubling of distance in a hard site environment. Line source noise, when produced



within a relatively flat environment with absorptive vegetation, decreases four and one-half decibels for each doubling of distance.

There are many ways to rate noise for various time periods, but an appropriate rating of ambient noise affecting humans also accounts for the annoyance effects of sound. Equivalent continuous sound level ( $L_{eq}$ ) is the total sound energy of time-varying noise over a sample period. However, the predominant rating scales for human communities in the State of California are the  $L_{eq}$  and community noise equivalent level (CNEL) or the day-night average level ( $L_{dn}$ ) based on A-weighted decibels (dBA). CNEL is the time-varying noise over a 24-hour period, with a 5 dBA weighting factor applied to the hourly  $L_{eq}$  for noises occurring from 7:00 p.m. to 10:00 p.m. (defined as relaxation hours) and 10 dBA weighting factor applied to noise occurring from 10:00 p.m. to 7:00 a.m. (defined as sleeping hours).  $L_{dn}$  is similar to the CNEL scale but without the adjustment for events occurring during the evening hours. CNEL and  $L_{dn}$  are within 1 dBA of each other and are normally exchangeable. The noise adjustments are added to the noise events occurring during the more sensitive hours.

Other noise rating scales of importance when assessing the annoyance factor include the maximum noise level ( $L_{max}$ ), which is the highest exponential time-averaged sound level that occurs during a stated time period. The noise environments discussed in this analysis are specified in terms of maximum levels denoted by  $L_{max}$  for short-term noise impacts.  $L_{max}$  reflects peak operating conditions and addresses the annoyance aspects of intermittent noise.

Another noise scale often used together with the  $L_{max}$  in noise ordinances for enforcement purposes is noise standards in terms of percentile noise levels. For example, the  $L_{10}$  noise level represents the noise level exceeded 10 percent of the time during a stated period. The  $L_{50}$  noise level represents the median noise level. Half the time the noise level exceeds this level, and half the time it is less than this level. The  $L_{90}$  noise level represents the noise level exceeded 90 percent of the time and is considered the background noise level during a monitoring period. For a relatively constant noise source, the  $L_{eq}$  and  $L_{50}$  are approximately the same.

Noise impacts can be described in three categories. The first is audible impacts, which refers to increases in noise levels noticeable to humans. Audible increases in noise levels generally refer to a change of 3.0 dB or greater, since this level has been found to be barely perceptible in exterior environments. The second category, potentially audible, refers to a change in the noise level between 1.0 and 3.0 dB. This range of noise levels has been found to be noticeable only in laboratory environments. The last category is changes in noise level of less than 1.0 dB, which are inaudible to the human ear. Only audible changes in existing ambient or background noise levels are considered potentially significant.

## PSYCHOLOGICAL AND PHYSIOLOGICAL EFFECTS OF NOISE

Physical damage to human hearing begins at prolonged exposure to noise levels higher than 85 dBA. Exposure to high noise levels affects the entire system, with prolonged noise exposure in excess of 75 dBA increasing body tensions and thereby affecting blood pressure and functions of the heart and the nervous system. In comparison, extended periods of noise exposure above 90 dBA would result in permanent cell damage. When the noise level reaches 120 dBA, a tickling sensation occurs in the human ear even with short-term exposure. This level of noise is called the threshold of feeling. As the sound reaches 140 dBA, the tickling sensation is replaced by the feeling of pain in the ear. This is

called the threshold of pain. A sound level of 160 to 165 dBA will result in dizziness or loss of equilibrium.

The ambient or background noise problem is widespread and generally more concentrated in urban areas than in outlying, less developed areas.

Table A lists "Definitions of Acoustical Terms;" Table B shows "Common Sound Levels and Their Noise Sources;" and Table C shows "Land Use Compatibility for Exterior Community Noise" recommended by the California Department of Health, Office of Noise Control.

## SETTING

### Existing Sensitive Land Uses in the Project Area

Sensitive receptors include residences, schools, hospitals, and similar uses that are sensitive to noise. There are existing residences to the east, west, and north of the project site. These sensitive land uses may be potentially affected by the noise generated during construction on the project site.

### Overview of the Existing Noise Environment

The primary existing noise sources in the project area are transportation facilities. Traffic on Hillsdale Road, Vista Grande Road, and other streets in the project vicinity is the source of ambient noise in the project vicinity. The average daily traffic volumes (ADT) for roadway segments in the project vicinity were provided by the County of San Diego (County) Traffic Department<sup>1</sup> based on traffic counts conducted in January 2002 (2,790 on southbound Vista Grande Road) and April 2006 (5,410 on westbound Hillsdale Road and 5,380 on eastbound Hillsdale Road).

Based on the County's recommendations,<sup>2</sup> a vehicle mix of 0.90/0.09/0.01 for automobiles/medium trucks/heavy-duty trucks for Hillsdale Road should be used. There is no vehicle mix information available for Vista Grande Road. In order to be consistent, the same vehicle mix is used for Vista Grande in the project vicinity.

Caltrans SOUND32 model, which predicts sound levels in terms of the peak-hour traffic noise level ( $L_{eq}$ ) was used per the County's requirements. This model requires various parameters, including traffic volumes, vehicle mix, vehicle speed, and roadway geometry to compute typical equivalent noise levels during the peak hour (which assumes 10 percent of the daily traffic volumes). Table D provides the existing (2006) traffic noise levels adjacent to roadway segments in the project vicinity. These noise levels included a calibration factor obtained from modeling the traffic noise levels with concurrent traffic counts during the noise monitoring period. The specific assumptions used in developing these noise levels and the model printouts are provided in Appendix A. Traffic noise is generally moderate along existing street segments in the project vicinity. As suggested by County staff, no correction was made to the  $L_{eq}$  levels to obtain the corresponding CNEL levels because peak noise hour estimates were used.

<sup>1</sup> Maria Lopez, (858) 874-4030, personal communication, July 25, 2006.

<sup>2</sup> Ibid.

**Table A: Definitions of Acoustical Terms**

Term	Definition
Decibel, dB	A unit of level that denotes the ratio between two quantities that are proportional to power; the number of decibels is 10 times the logarithm (to the base 10) of this ratio.
Frequency, Hz	Of a function periodic in time, the number of times that the quantity repeats itself in one second (i.e., number of cycles per second).
A-Weighted Sound Level, dBA	The sound level obtained by use of A-weighting. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise. All sound levels in this report are A-weighted, unless reported otherwise.
$L_{02}$ , $L_{08}$ , $L_{50}$ , $L_{90}$	The fast A-weighted noise levels that are equaled or exceeded by a fluctuating sound level 2 percent, 8 percent, 50 percent, and 90 percent of a stated time period, respectively.
Equivalent Continuous Noise Level, $L_{eq}$	The level of a steady sound that, in a stated time period and at a stated location, has the same A-weighted sound energy as the time-varying sound.
Community Noise Equivalent Level, CNEL	The 24-hour A-weighted average sound level from midnight to midnight, obtained after the addition of 5 decibels to sound levels occurring in the evening from 7:00 p.m. to 10:00 p.m. and after the addition of 10 decibels to sound levels occurring in the night between 10:00 p.m. and 7:00 a.m.
Day/Night Noise Level, $L_{dn}$	The 24-hour A-weighted average sound level from midnight to midnight, obtained after the addition of 10 decibels to sound levels occurring in the night between 10:00 p.m. and 7:00 a.m.
$L_{max}$ , $L_{min}$	The maximum and minimum A-weighted sound levels measured on a sound level meter, during a designated time interval, using fast time averaging.
Ambient Noise Level	The all-encompassing noise associated with a given environment at a specified time, usually a composite of sound from many sources at many directions, near and far; no particular sound is dominant.
Intrusive	The noise that intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, and time of occurrence and tonal or informational content as well as the prevailing ambient noise level.

Source: Handbook of Acoustical Measurement and Noise Control, 1991.

**Table B: Common Sound Levels and Their Noise Sources**

Noise Source	A-Weighted Sound Level in Decibels	Noise Environments	Subjective Evaluations
Near Jet Engine	140	Deafening	128 times as loud
Civil Defense Siren	130	Threshold of Pain	64 times as loud
Hard Rock Band	120	Threshold of Feeling	32 times as loud
Accelerating Motorcycle at a Few Feet Away	110	Very Loud	16 times as loud
Pile Driver; Noisy Urban Street/Heavy City Traffic	100	Very Loud	8 times as loud
Ambulance Siren; Food Blender	95	Very Loud	
Garbage Disposal	90	Very Loud	4 times as loud
Freight Cars; Living Room Music	85	Loud	
Pneumatic Drill; Vacuum Cleaner	80	Loud	2 times as loud
Busy Restaurant	75	Moderately Loud	
Near Freeway Auto Traffic	70	Moderately Loud	Reference Level
Average Office	60	Quiet	½ as loud
Suburban Street	55	Quiet	
Light Traffic; Soft Radio Music in Apartment	50	Quiet	¼ as loud
Large Transformer	45	Quiet	
Average Residence without Stereo Playing	40	Faint	⅛ as loud
Soft Whisper	30	Faint	
Rustling Leaves	20	Very Faint	
Human Breathing	10	Very Faint	Threshold of Hearing
	0	Very Faint	

Source: Compiled by LSA Associates, Inc., 2004.

**Table C: Land Use Compatibility for Exterior Community Noise**

Land Use Category	Noise Range (Ldn or CNEL), dB			
	I	II	III	IV
Passively used open spaces	50	50-55	55-70	70+
Auditoriums, concert halls, amphitheaters	45-50	50-65	65-70	70+
Residential—low-density single family, duplex, mobile homes	50-55	55-70	70-75	75+
Residential—multifamily	50-60	60-70	70-75	75+
Transient lodging—motels, hotels	50-60	60-70	70-80	80+
Schools, libraries, churches, hospitals, nursing homes	50-60	60-70	70-80	80+
Actively used open spaces—playgrounds, neighborhood parks	50-67	—	67-73	73+
Golf courses, riding stables, water recreation, cemeteries	50-70	—	70-80	80+
Office buildings, business commercial and professional	50-67	67-75	75+	—
Industrial, manufacturing, utilities, agriculture	50-70	70-75	75+	—

Source: Office of Noise Control, California Department of Health, 1976.

**Noise Range I—Normally Acceptable:** Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.

**Noise Range II—Conditionally Acceptable:** New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made, and needed noise insulation features are included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning, will normally suffice.

**Noise Range III—Normally Unacceptable:** New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.

**Noise Range IV—Clearly Unacceptable:** New construction or development should generally not be undertaken.

**Table D: Existing (2006) Peak Hour Traffic Noise Levels**

Lot #/ Receptor	Traffic Noise Level dBA $L_{eq}$	Traffic Noise Level dBA CNEL
Lot 1/R-1	57	57
Lot 2/R-2	54	54
Lot 3/R-3	53	53
Lot 4/R-4	52	52
Lot 5/R-5	54	54

Source: LSA Associates, Inc., July 2006.

LSA conducted an ambient noise survey on the project site on July 20, 2006. A short-term (20 minutes) noise measurement was conducted at a location on the southern boundary of Lot 1 on site. Table E lists the noise measurement results. Table F describes the location of this measurement site and major noise sources observed. Concurrent traffic counts were also taken during the noise measurement. Table F shows that most traffic observed in the project area was automobiles, with occasional medium trucks. No heavy-duty trucks were seen during the noise measurement periods. Table E shows that the ambient noise level in the project area is moderate, at about 52 dBA  $L_{eq}$ . Some aircraft overflight noise was observed during the noise measurement period.

**Table E: Short-Term Ambient Noise Monitoring Results**

Monitor No.	Date	Start Time	Duration	dBA $L_{eq}$
M-1	7/20/2006	2:01 p.m.	20 minutes	51.8

Source: LSA Associates, Inc., July 2006.

**Table F: Physical Location of Noise Level Measurements**

Monitor No.	Location Description	Noise Sources	Traffic Count (15 minutes)	Comments
M-1	On the northwest corner of Hillsdale Road and Vista Grande Road; approximately 210 feet from Hillsdale Road and 425 feet from Vista Grande Road.	Traffic on Hillsdale Road; faint traffic on Vista Grande Road; some aircraft noise.	<u>Hillsdale Road WB/EB</u> Auto = 50/62 Medium Trucks = 1/1 Heavy Trucks = 0/0 <u>Vista Grande Road NB/SB</u> Auto = 33/20 Medium Trucks = 1/0 Heavy Trucks = 0/0	An approximate 6-foot-high wooden fence along eastern boundary of the project site.  An approximate 6-foot-high chain-link fence along northern boundary.  An approximate 3-foot-high wire fence along western boundary.

Source: LSA Associates, Inc., July 2006.

### Thresholds of Significance

A project will normally have a significant noise-related effect on the environment if it will substantially increase the ambient noise levels for adjoining areas or conflict with adopted environmental plans and goals of the community in which it is located. The applicable noise standards governing the project site are the criteria in the County's Noise Element and Noise Control Ordinance.

### County of San Diego Noise Guidelines

The County of San Diego has adopted a Noise Element of the General Plan (adopted February 20, 1975, latest Amendment September 27, 2006).

The following is taken from the County's Noise Element, Policy 4b:

Because exterior community noise equivalent levels (CNEL) above 60 decibels and/or interior CNEL above 45 decibels may have an adverse effect on public health and welfare, it is the policy of the County of San Diego that:

1. Whenever it appears that new *development* may result in any (existing or future) *noise sensitive land use* being subject to noise levels of CNEL equal to 60 *decibels (A)* or greater, an acoustical analysis shall be required.
2. If the acoustical analysis shows that noise levels at any *noise sensitive land use* will exceed CNEL equal to 60 decibels, modifications shall be made to the *development* which reduce the *exterior noise level* to less than CNEL of 60 *decibels (A)* and the *interior noise level* to less than CNEL of 45 *decibels (A)*.
3. If modifications are not made to the *development* in accordance with paragraph 2 above, the *development* shall not be approved unless a finding is made that there are specifically identified overriding social or economic considerations which warrant approval of the development without such modification; provided, however, if the acoustical study shows that sound levels for any noise sensitive land use will exceed a CNEL equal to 75 *decibels (A)* even with such modifications, the *development* shall not be approved irrespective of such social or economic considerations.

A noise-sensitive land use is any residence, hospital, school, hotel, resort, library, or similar facility where quiet is an important attribute of the environment.

In its San Diego County Code of Regulatory Ordinance, Chapter 4, Noise Abatement and Control, Section 36.404, Sound Level Limits, the County specifies maximum noise levels for the one-hour average sound level at any point on or beyond the boundaries of the property on which the sound is produced, as shown in Table G.

**Table G: Noise Abatement and Control for Determining Zonal Property Line Sound Level Limits**

<b>Zone</b>	<b>Time</b>	<b>Applicable Limit One-Hour Average Sound Level (dB)</b>
RS, RD, RR, RMH, A70, A72, S80, S81, S87, S88, S90, S92, RV, and RU. Use regulations with a density of less than 11 dwelling units per acre.	7 a.m. to 10 p.m.	50
	10 p.m. to 7 a.m.	45
RRO, RC, RM, C30, S86, RV, RU, and V5. Use regulations with a density of 11 or more dwelling units per acre.	7 a.m. to 10 p.m.	55
	10 p.m. to 7 a.m.	50
S94, V4, and all other commercial zones.	7 a.m. to 10 p.m.	60
	10 p.m. to 7 a.m.	55
V1, V2	7 a.m. to 7 p.m.	60
V1, V2	7 p.m. to 10 p.m.	55
V1	10 p.m. to 7 a.m.	55
V2	10 p.m. to 7 a.m.	50
V3	7 a.m. to 10 p.m.	70
	10 p.m. to 7 a.m.	65
M50, M52, M54	Anytime	70
S82, M58, and all other industrial zones.	Anytime	75

Source: San Diego County Code of Regulatory Ordinance.

If the measured ambient level exceeds the applicable limit noted above, the allowable one hour average sound level shall be the ambient noise level. The ambient noise level shall be measured when the alleged noise violation source is not operating.

The sound level limit at a location on a boundary between two (2) zoning districts is the arithmetic mean of the respective limits for the two districts; provided however, that the one-hour average sound level limit applicable to extractive industries, including but not limited to borrow pits and mines, shall be 75 decibels at the property line regardless of the zone where the extractive industry is actually located.

The one-hour average property line sound level limits are 45 dBA (during nighttime hours between 10 p.m. and 7 a.m.) for all property lines.

In the County's Noise Abatement and Control ordinance, Section 36.410, it states that "Construction equipment, except for emergency work, shall be unlawful for any person to operate between the hours of 7:00 p.m. of any day and 7:00 a.m. of the following day." It also states that "It shall be unlawful for any person to operate construction equipment on Sundays, and days appointed by the President, Governor, or the Board of Supervisors for a public fast, Thanksgiving, or holiday, but a person may operate construction equipment on the above-specified days between the hours of 10:00 a.m. and 5:00



p.m. at his residence or for the purpose of constructing a residence for himself, provided that the average sound level does not exceed 75 decibels during the period of operation and that the operation of construction equipment is not carried out for profit or livelihood.”

## PROJECT IMPACTS

### Construction Noise

Short-term noise impacts would be associated with excavation, grading, and erecting of buildings on site during construction of the proposed project. Construction-related short-term noise levels would be higher than existing ambient noise levels in the project area today but would no longer occur once construction of the project is completed.

Two types of short-term noise impacts could occur during the construction of the proposed project. First, construction crew commutes and the transport of construction equipment and materials to the site for the proposed project would incrementally increase noise levels on access roads leading to the site. There will be a relatively high single-event noise exposure potential at a maximum level of 87 dBA  $L_{max}$  with trucks passing at 50 feet. However, the project site will be balanced with cut and fill, and the projected construction traffic will be at most 20 trips per day and are small when compared to the existing traffic volumes on Hillsdale Road and its associated long-term noise level change will not be perceptible. Therefore, short-term construction-related worker commutes and equipment transport noise impacts would not be substantial.

The second type of short-term noise impact is related to noise generated during excavation, grading, and construction on the project site. Construction is performed in discrete steps, each of which has its own mix of equipment and, consequently, its own noise characteristics. These various sequential phases would change the character of the noise generated on the site. Therefore, the noise levels vary as construction progresses. Despite the variety in the type and size of construction equipment, similarities in the dominant noise sources and patterns of operation allow construction-related noise ranges to be categorized by work phase. Table H lists maximum noise levels recommended for noise impact assessments for typical construction equipment based on a distance of 50 feet between the equipment and a noise receptor. Typical maximum noise levels range up to 91 dBA at 50 feet during the noisiest construction phases. The site preparation phase, which includes excavation and grading of the site, tends to generate the highest noise levels, because the noisiest construction equipment is earthmoving equipment. Earthmoving equipment includes excavating machinery such as backfillers, bulldozers, draglines, and front loaders. Earthmoving and compacting equipment includes compactors, scrapers, and graders. Typical operating cycles for these types of construction equipment may involve one or two minutes of full power operation followed by three or four minutes at lower power settings.

**Table H: Typical Maximum Construction Equipment Noise Levels ( $L_{max}$ )**

Type of Equipment	Range of Maximum Sound Level Measured at 50 feet (dBA)	Suggested Maximum Sound Level for Analysis at 50 feet (dBA)
Pile Drivers, 12,000 to 18,000 ft-lb/blow	81-96	93
Rock Drills	83-99	96
Jackhammers	75-85	82
Pneumatic Tools	78-88	85
Pumps	74-84	80
Scrapers	83-91	87
Haul Trucks	83-94	88
Cranes	79-86	82
Portable Generators	71-87	80
Rollers	75-82	80
Dozers	77-90	85
Tractors	77-82	80
Front-End Loaders	77-90	86
Hydraulic Backhoes	81-90	86
Hydraulic Excavators	81-90	86
Graders	79-89	86
Air Compressors	76-89	86
Trucks	81-87	86

Source: Noise Control for Buildings and Manufacturing Plants, Bolt, Beranek, & Newman, 1987.

Construction of the proposed project is expected to require the use of scrapers, bulldozers, and water and pickup trucks. This equipment would be used on site. Based on Table H, the maximum noise level generated by each scraper on the proposed project site is assumed to be 87 dBA  $L_{max}$  at 50 feet from the scraper. Each bulldozer would also generate 85 dBA  $L_{max}$  at 50 feet. The maximum noise level generated by water and pickup trucks is approximately 86 dBA  $L_{max}$  at 50 feet from these vehicles. Each doubling of a sound source with equal strength increases the noise level by 3 dBA. Assuming that each piece of construction equipment operates at some distance from the other equipment, the worst-case combined noise level at each individual residence during this phase of construction would be 91 dBA  $L_{max}$  at a distance of 50 feet from the active construction area. In some cases, slopes will be constructed along the property line, and grading equipment will need to be used in those areas. In addition, a brow ditch will be running along the back side of all of the properties,

thus making the grading go all the way to the property line. Many of the existing homes to the east, west, and southwest are approximately 50 feet from the property line. There are no intervening structures between these homes and the project site. These closest residences may be subject to short-term noise reaching 91 dBA  $L_{max}$  generated by construction activities near the project boundary. If continued for more than an hour, the cumulative  $L_{eq}$  level over that hour would potentially exceed the County's 75 dBA noise standard. Although this maximum construction noise would occur only intermittently when construction activity occurs near the project's boundary, in order to meet the 75 dBA noise standard over a one-hour period, a temporary construction noise barrier with a minimum height of 8 feet above grade is required along the project's western, eastern and southern boundaries where existing residences exist at 50 feet from the project site. The construction noise barrier can consist of plywood, concrete masonry units, or other materials with a minimum density of 3 pounds per square foot. Noise insertion loss for this construction noise barrier is expected to be 6 to 10 dBA, depending on the active construction area. Figure 3 depicts the location where this 8-foot-high temporary construction barrier is required. The construction noise barrier should be implemented prior to the start of the grading period. Therefore, compliance with the construction hours and maximum noise level specified in Section 36.410 of the County Ordinance and the temporary construction barrier would be sufficient for off-site sensitive human receptors.

### Traffic Noise Impact

Exterior land uses on site that would be potentially exposed to high noise levels are the home lots fronting Hillsdale Road. The project site is not directly adjacent to Vista Grande Road.

As a worst-case scenario, the distance to the 60 dBA CNEL contour line was calculated with the Federal Highway Administration (FHWA) Highway Traffic Noise Prediction Model (FHWA RD-77-108). This model calculates the 24-hour weighted CNEL directly with the average daily traffic volume, based on the County's suggested vehicle distribution mix and vehicle speeds. As suggested by county staff, a hard-site propagation is assumed for second floor receptor locations. Soft-site propagation was used for ground floor receptors. The calculated distance represents a worst-case scenario, which assumes that no shielding is provided by manmade or natural barriers between the traffic and the location where the noise contour is drawn.

Table I lists the projected future traffic noise levels along Hillsdale Road and Vista Grande Road and Vista Grande Road.

Figure 4 depicts the 60 dBA CNEL contour along Hillsdale Road in the project vicinity.



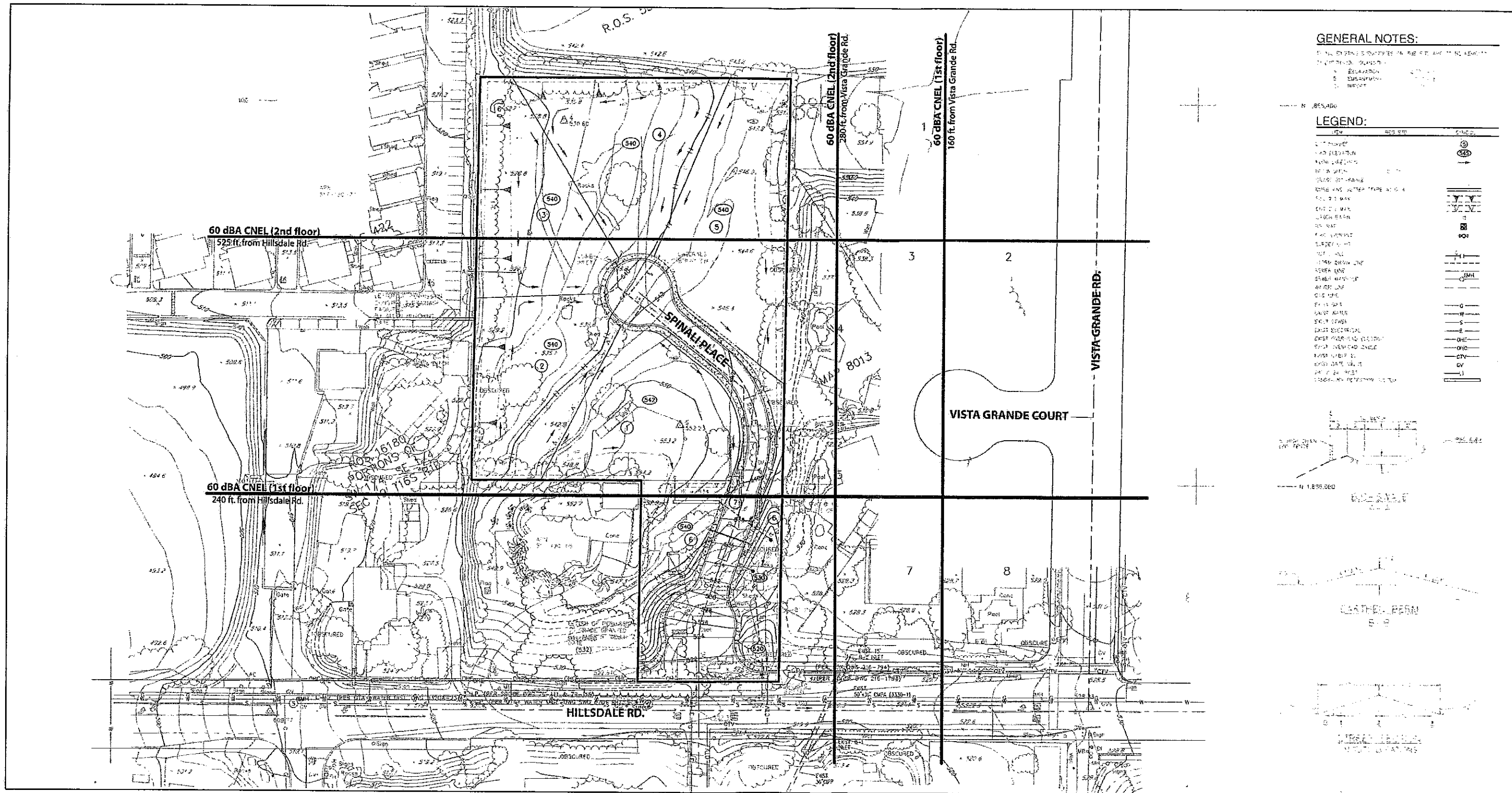
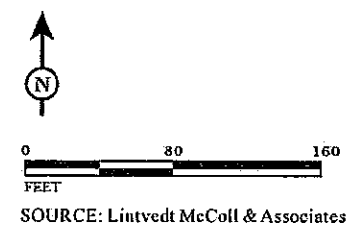


FIGURE 4



Frances Knoll  
60 dBA CNEL Contour Map

**Table I: Buildout Year (2030) Traffic Noise Levels**

Roadway Segment	ADT	Centerline to 70 CNEL (feet)	Centerline to 65 CNEL (feet)	Centerline to 60 CNEL (feet)
Ground Floor (Soft Site)				
Hillsdale Road	7,000	57	113	240
Vista Grande Road	6,000	<50 <sup>1</sup>	76	158
Second Floor (Hard Site)				
Hillsdale Road	7,000	58	168	526
Vista Grande Road	6,000	<50	91	278

Source: LSA Associates, Inc., August 2007

Because the project proposes only five dwelling units, the project-related traffic contribution to roadway segments in the project vicinity would be small and negligible. The increase would be less than the 3 dBA threshold normally perceptible by the human ear. No significant project-related traffic noise impacts on off-site land uses would occur. No mitigation measures would be required for off-site uses.

At the County's request, future traffic noise impacts were evaluated with the road buildout and improvements with the use of design speeds and a reduction in future traffic volume. As noted in the County letter of March 30, 2006, the future buildout for Hillsdale Road in this area is 7,000 ADT (SANDAG 2030), and Vista Grande will have 6,000 ADT (SANDAG 2030). The design speeds for these roadways are 55 miles per hour (mph) for Hillsdale Road (a Major Road) and 45 mph for Vista Grande (a Light Collector).

As described previously, based on the County's recommendations, a local traffic mix of 90.0/9.0/1.0 percent for automobiles/medium trucks/heavy-duty trucks was used for both Hillsdale Road and Vista Grande Road. In addition, a uniform speed distribution is used for all types of vehicles in the modeling of traffic noise.

It is noted that Chase Avenue will be part of the future improvements and may serve to reduce traffic volumes in the vicinity of the project (east of the Wind River Road intersection).

At the request of the County staff, LSA used Caltrans SOUND32 (which predicts sound levels in terms of the peak-hour traffic noise level,  $L_{eq}$ ) to evaluate the noise impacts and mitigation measures for the proposed dwelling units based on the project's preliminary grading plan and building pad information. Because no building footprints are available at this stage of the planning process, the receptor locations for potential outdoor active use areas such as backyards are based on the driveway access to each of these home lots. Figure 5 depicts these receptor locations. It was assumed that both outdoor active use areas (backyards or balconies) and building shells would be impacted by the traffic noise from Hillsdale Road.

<sup>1</sup> Traffic noise within 50 feet of roadway centerline requires site-specific analysis.



Table J lists the  $L_{eq}$  noise levels calculated with the Caltrans SOUND32 model for ground-floor and second-floor receptor locations. As suggested by County staff, the "hard site" propagation rule was used for second-story receptor locations. Table K lists the CNEL levels (no correction to the  $L_{eq}$  levels because peak hour estimates were used) for corresponding receptor locations.

**Table J: Future (2030) Traffic Noise Levels,  $L_{eq}$  (dBA)**

Lot #/ Receptor	Exterior Noise Level, dBA $L_{eq}$		Interior Noise Level, dBA $L_{eq}$	
	Ground Floor	Second Floor	Ground Floor (Windows Closed)	Second Floor (Windows Closed)
Lot 1/R1	58	60	43	45
Lot 2/R2	56	57	41	42
Lot 3/R3	54	56	39	41
Lot 4/R4	53	55	38	40
Lot 5/R5	56	58	41	43

Source: LSA Associates, Inc., July 2006.

Based on Table K, no ground-floor or second-floor outdoor active use areas on these home lots would be exposed to traffic noise exceeding the County's 60 dBA CNEL noise standard for residential uses. No sound walls would be required for these outdoor active use areas.

**Table K: Future Traffic Noise Levels, CNEL (dBA)**

Lot #/ Receptor	Exterior Noise Level, CNEL		Interior Noise Level, CNEL	
	Ground Floor	Second Floor	Ground Floor (Windows Closed)	Second Floor (Windows Closed)
Lot 1/R1	58	60	43	45
Lot 2/R2	56	57	41	42
Lot 3/R3	54	56	39	41
Lot 4/R4	53	55	38	40
Lot 5/R5	55	58	41	43

Source: LSA Associates, Inc., July 2006.

Based on the data provided in the Environmental Protection Agency's (EPA) Protective Noise Levels (EPA 550/9-79-100, November 1979), standard homes in Southern California (warm climate areas) provide at least 12 dBA of exterior-to-interior noise attenuation with windows open and 24 dBA with windows closed. In addition, the California Airport Land Use Planning Handbook (January 2002) stated that newer homes constructed to meet current energy-conserving building codes can provide 25 to 30 dBA in noise reduction. However, the County does not support the EPA assumptions without an interior noise analysis. The County does support, however, that most residences have a minimum noise reduction of 15 dBA (County Noise Element) between exterior noise conditions and the interior noise-sensitive locations (45 dBA CNEL). Therefore, dwelling units exposed to an exterior noise level exceeding 60 dBA CNEL ( $45 + 15 = 60$  dBA CNEL) would be required to consider window



specifications based on the finalized building plans. A Noise Protection Easement to assess the interior noise issues prior to the issuance of the building permits is required.

As shown in Table K, the interior noise levels at all dwelling units with windows closed would be below the 45 dBA CNEL standard. Therefore, no building facade upgrades such as double-paned windows with sound transmission class (STC) ratings higher than standard building construction provides (up to STC-28) are required. An air-conditioning system, a form of mechanical ventilation, would be required for dwelling units on Lots 1, 2, 3, and 5 to ensure that windows can remain closed for prolonged periods of time to meet the 45 dBA CNEL interior noise standard.

## **MITIGATION MEASURES**

### **Construction Impacts**

Construction will be limited to the hours of 7:00 a.m. to 7:00 p.m. on any working day except Sundays and holidays, in accordance with the County Ordinance. No construction activities are permitted outside of these hours or on Sundays and holidays. No equipment shall be operated so as to cause noise at a level in excess of 75 dBA when measured at or within the property lines of any residential property. In addition, a temporary construction barrier is required along the project's eastern, western, and southern boundaries where existing residences exist (see Figure 3), with a minimum height of eight feet.

The following measures can be implemented to reduce potential construction noise impacts on nearby sensitive receptors:

1. During all site excavation and grading, the project contractors shall equip all construction equipment, fixed or mobile, with properly operating and maintained mufflers consistent with manufacturers' standards.
2. The project contractor shall place all stationary construction equipment so that emitted noise is directed away from sensitive receptors nearest the project site.
3. The construction contractor shall locate equipment staging in areas that will create the greatest distance between construction-related noise sources and noise-sensitive receptors nearest the project site during all project construction.

### **Traffic Noise Impacts**

**Outdoor Active Use Area.** No mitigation measures are required for outdoor active use areas associated with these residential lots.

**Interior Noise Sound Wall.** To meet the County's 45 dBA CNEL interior noise standard, the following mitigation measure will be required:

- Mechanical ventilation such as air-conditioning systems would be required for dwelling units on Lots 1, 2, 3, and 5.

## **LEVEL OF SIGNIFICANCE AFTER MITIGATION**

With implementation of the identified mitigation measures, potential short-term and long-term noise impacts would be reduced to below the level of significance.

## **REFERENCES**

- Bolt, Beranek & Newman, Noise Control for Buildings and Manufacturing Plants, 1987.
- County of San Diego, Noise Abatement and Control.
- County of San Diego, Noise Element of the General Plan.
- County of San Diego Traffic Department, Average Daily Traffic Counts and Vehicle Mix. July 2006.
- Federal Highway Administration, Highway Traffic Noise Prediction Model, FHWA RD-77-108, 1977.

**APPENDIX A**

**SOUND32 HIGHWAY TRAFFIC NOISE MODEL PRINTOUTS**

## **APPENDIX B**

### **FHWA HIGHWAY TRAFFIC NOISE MODEL PRINTOUTS**

**FRANCES KNOLL SUBDIVISION**

**SOUND32 PRINTOUTS**

**CALIBRATION**

Frances Knoll Calibration M-1  
 T-Hillsdale WB prt 1, 1  
 200 , 40 , 4 , 40 , 0 , 35  
 T-Hillsdale WB prt 2, 2  
 200 , 40 , 4 , 40 , 0 , 35  
 T-Hillsdale WB prt 3, 3  
 200 , 40 , 4 , 40 , 0 , 35  
 T-Hillsdale EB prt 1, 4  
 248 , 40 , 4 , 40 , 0 , 35  
 T-Hillsdale EB prt 2, 5  
 248 , 40 , 4 , 40 , 0 , 35  
 T-Hillsdale EB prt 3, 6  
 248 , 40 , 4 , 40 , 0 , 35  
 T-Vista Grande NB prt 1, 7  
 132 , 40 , 4 , 40 , 0 , 35  
 T-Vista Grande NB prt 2, 8  
 132 , 40 , 4 , 40 , 0 , 35  
 T-Vista Grande NB prt 1, 9  
 80 , 40 , 0 , 40 , 0 , 35  
 T-Vista Grande NB prt 2, 10  
 80 , 40 , 0 , 40 , 0 , 35  
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 N,7944.8,7764.6,528.6,  
 N,7847.5,7764.6,528.6,  
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 N,7699.2,7762.9,528.6,  
 N,7633.3,7762.9,528.6,  
 N,7555.8,7761.3,528.6,  
 N,7470.1,7761.3,528.6,  
 N,7399.2,7761.3,528.6,  
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 N,7247.6,7758,528.6,  
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 N,7112.5,7758,522.9,  
 N,7059.7,7758,521.1,  
 N,6990.5,7759.7,520.3,  
 N,6925.0,7759.6,520.3,  
 L-Hillsdale WB prt 2, 2  
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 N,6844.8,7757,522,  
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 N,6628.9,7755.7,522,  
 N,6557.6,7756.1,520,  
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 N,6259.7,7757.7,500,  
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 N,6029.7,7755.3,488,  
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 N,5830.0,7756.3,480,  
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 N,5621.9,7755,480,  
 N,5531.9,7755.6,480,

L-Hillsdale EB prt 1, 4  
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 N,7258.3,8157,532,  
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 L-Vista Grande NB prt 2, 8  
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 N,7256.3,7976.3,532,  
 N,7254.9,7886.3,532,  
 N,7253.6,7786.8,526.7,

L-Vista Grande SB prt 1, 9  
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 7232.0,9005.9,532,532,  
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 7228.0,8680.3,532,532,



7226.0,8577.8,532,532,  
B-Vista Grande SB prt 2, 5 , 2 , 0 ,0  
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6914.2,8093.7,542,542,  
6914.2,8014.3,540,540,  
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6911.2,7789.2,528.3,528.3,  
R, 1 , 67 ,500  
6774.2,7976.7,559.2,M-1  
D, 4.5  
ALL,ALL  
C,C

SOUND32 - RELEASE 07/30/91, MODIFIED 04/22/00

TITLE:

Frances Knoll Calibration M-1

1

BARRIER DATA

\*\*\*\*\*

BAR ELE	0	1	2	3	4	5	6	7	BAR ID	LENGTH	TYPE
1	-	0.*							B1 P1	70.9	
2	-	0.*							B1 P2	52.8	
3	-	0.*							B1 P3	69.2	
4	-	0.*							B1 P4	65.5	
5	-	0.*							B1 P5	80.3	
6	-	0.*							B1 P6	86.1	
7	-	0.*							B1 P7	67.8	
8	-	0.*							B1 P8	62.0	
9	-	0.*							B1 P9	71.3	
10	-	0.*							B2 P1	72.9	
11	-	0.*							B2 P2	77.2	
12	-	0.*							B2 P3	58.2	
13	-	0.*							B2 P4	90.4	
14	-	0.*							B2 P5	63.8	
15	-	0.*							B2 P6	80.3	
16	-	0.*							B2 P7	86.2	
17	-	0.*							B2 P8	68.0	
18	-	0.*							B2 P9	62.0	
19	-	0.*							B2 P10	69.9	
20	-	0.*							B3 P1	73.0	
21	-	0.*							B3 P2	77.0	
22	-	0.*							B3 P3	58.1	
23	-	0.*							B3 P4	90.0	
24	-	0.*							B4 P1	90.5	
25	-	0.*							B4 P2	92.5	
26	-	0.*							B4 P3	94.4	
27	-	0.*							B4 P4	94.5	
28	-	0.*							B4 P5	108.6	
29	-	0.*							B4 P6	110.5	
30	-	0.*							B4 P7	104.6	
31	-	0.*							B4 P8	110.5	
32	-	0.*							B4 P9	102.5	
33	-	0.*							B5 P1	116.7	
34	-	0.*							B5 P2	111.4	
35	-	0.*							B5 P3	103.3	
36	-	0.*							B5 P4	89.7	
37	-	0.*							B5 P5	91.8	
38	-	0.*							B5 P6	88.9	
39	-	0.*							B5 P7	90.0	
40	-	0.*							B5 P8	99.7	
41	-	0.*							B6 P1	91.8	

**FRANCES KNOLL SUBDIVISION**

**SOUND32 PRINTOUTS**

**EXISTING CONDITIONS**

Frances Knoll Existing Condition (Modeled)

T-Hillsdale WB prt 1, 1  
 486 , 40 , 51 , 40 , 4 , 35  
 T-Hillsdale WB prt 2, 2  
 486 , 40 , 51 , 40 , 4 , 35  
 T-Hillsdale WB prt 3, 3  
 486 , 40 , 51 , 40 , 4 , 35  
 T-Hillsdale EB prt 1, 4  
 484 , 40 , 51 , 40 , 4 , 35  
 T-Hillsdale EB prt 2, 5  
 484 , 40 , 51 , 40 , 4 , 35  
 T-Hillsdale EB prt 3, 6  
 484 , 40 , 51 , 40 , 4 , 35  
 T-Vista Grande NB prt 1, 7  
 271 , 40 , 28 , 40 , 2 , 35  
 T-Vista Grande NB prt 2, 8  
 271 , 40 , 28 , 40 , 2 , 35  
 T-Vista Grande NB prt 1, 9  
 271 , 40 , 28 , 40 , 2 , 35  
 T-Vista Grande NB prt 2, 10  
 271 , 40 , 28 , 40 , 2 , 35  
 L-Hillsdale WB prt 1, 1  
 N,7944.8,7764.6,528.6,  
 N,7847.5,7764.6,528.6,  
 N,7768.4,7762.9,528.6,  
 N,7699.2,7762.9,528.6,  
 N,7633.3,7762.9,528.6,  
 N,7555.8,7761.3,528.6,  
 N,7470.1,7761.3,528.6,  
 N,7399.2,7761.3,528.6,  
 N,7325.1,7758,528.6,  
 N,7247.6,7758,528.6,  
 N,7183.3,7759.6,526,  
 N,7112.5,7758,522.9,  
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 L-Hillsdale WB prt 2, 2  
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 N,6628.9,7755.7,522,  
 N,6557.6,7756.1,520,  
 N,6484.8,7756.6,517,  
 N,6407.8,7757.7,512,  
 N,6349.7,7757,508,  
 N,6259.7,7757.7,500,  
 N,6196.0,7756.5,496,  
 N,6115.8,7755.2,492,  
 N,6029.7,7755.3,488,  
 N,5961.8,7755.3,484,  
 N,5899.9,7755.3,480,  
 L-Hillsdale WB prt 3, 3  
 N,5899.9,7755.3,480,  
 N,5830.0,7756.3,480,  
 N,5757.0,7755.6,480,  
 N,5680.0,7755.6,480,  
 N,5621.9,7755,480,  
 N,5531.9,7755.6,480,

42	-	0.*	B6 P2	76.0
43	-	0.*	B6 P3	70.5
44	-	0.*	B6 P4	65.2
45	-	0.*	B6 P5	79.4
46	-	0.*	B6 P6	69.4
47	-	0.*	B6 P7	74.5
48	-	0.*	B6 P8	81.7

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          0   1   2   3   4   5   6   7
1
REC REC ID      DNL  PEOPLE  LEQ(CAL)
-----
  1 M-1         67.   500.   51.9
BARRIER HEIGHT INDEX FOR EACH BARRIER SECTION
  1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1
  1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
CORRESPONDING BARRIER HEIGHTS FOR EACH SECTION
  0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.
0.
  0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.

```

L-Hillsdale EB prt 1, 4  
 N,7945.3,7736.5,528.6,  
 N,7848.0,7736.5,528.6,  
 N,7768.9,7734.8,528.6,  
 N,7699.7,7734.8,528.6,  
 N,7633.8,7734.8,528.6,  
 N,7556.3,7733.2,528.6,  
 N,7470.6,7733.2,528.6,  
 N,7399.7,7733.2,528.6,  
 N,7325.6,7729.9,528.6,  
 N,7248.1,7729.9,528.6,  
 N,7183.8,7731.5,526,  
 N,7113.0,7729.9,522.9,  
 N,7060.2,7729.9,521.1,  
 N,6991.0,7731.6,520.3,  
 N,6925.5,7731.5,520.3,  
 L-Hillsdale EB prt 2, 5  
 N,6925.5,7731.5,520.3,  
 N,6845.3,7728.9,522,  
 N,6759.2,7728.3,522.6,  
 N,6691.4,7727.6,522.9,  
 N,6629.4,7727.6,522,  
 N,6558.1,7728,520,  
 N,6485.3,7728.5,517,  
 N,6408.3,7729.6,512,  
 N,6350.2,7728.9,508,  
 N,6260.2,7729.6,500,  
 N,6196.5,7728.4,496,  
 N,6116.3,7727.1,492,  
 N,6030.2,7727.2,488,  
 N,5962.3,7727.2,484,  
 N,5900.4,7727.2,480,  
 L-Hillsdale EB prt 3, 6  
 N,5900.4,7727.2,480,  
 N,5830.5,7728.2,480,  
 N,5757.5,7727.5,480,  
 N,5680.5,7727.5,480,  
 N,5622.4,7726.9,480,  
 N,5532.4,7727.5,480,  
 L-Vista Grande NB prt 1, 7  
 N,7278.4,9485.8,532,  
 N,7276.4,9395.3,532,  
 N,7274.4,9302.9,532,  
 N,7272.4,9208.4,532,  
 N,7272.4,9113.9,532,  
 N,7272.4,9005.4,532,  
 N,7270.4,8894.8,532,  
 N,7270.4,8790.3,532,  
 N,7268.4,8679.7,532,  
 N,7266.3,8577.2,532,  
 N,7262.3,8460.6,532,  
 N,7261.2,8349.3,532,  
 N,7260.0,8246.7,532,  
 N,7258.3,8157,532,  
 N,7258.3,8065.2,532,  
 L-Vista Grande NB prt 2, 8  
 N,7258.3,8065.2,532,  
 N,7256.3,7976.3,532,  
 N,7254.9,7886.3,532,  
 N,7253.6,7786.8,526.7,

L-Vista Grande SB prt 1, 9  
 N,7248.6,9486.4,532,  
 N,7246.6,9395.9,532,  
 N,7244.6,9303.4,532,  
 N,7242.6,9209,532,  
 N,7242.6,9114.5,532,  
 N,7242.6,9005.9,532,  
 N,7240.6,8895.4,532,  
 N,7240.6,8790.8,532,  
 N,7238.6,8680.3,532,  
 N,7236.6,8577.8,532,  
 N,7232.6,8461.2,532,  
 N,7232.4,8349.8,532,  
 N,7226.0,8246.7,532,  
 N,7224.3,8157,532,  
 N,7224.3,8065.2,532,  
 L-Vista Grande SB prt 2, 10  
 N,7224.3,8065.2,532,  
 N,7222.3,7976.3,532,  
 N,7220.9,7886.3,532,  
 N,7219.6,7786.8,526.7,  
 B-Hillsdale WB prt 1, 1 , 2 , 0 , 0  
 7183.3,7770,526,526,  
 7112.5,7768.4,522.9,522.9,  
 7059.7,7768.4,521.1,521.1,  
 6990.5,7770.1,520.3,520.3,  
 6925.0,7770,520.3,520.3,  
 6844.8,7767.4,522,522,  
 6758.7,7766.8,522.6,522.6,  
 6690.9,7766.1,522.9,522.9,  
 6628.9,7766.1,522,522,  
 6557.6,7766.5,520,520,  
 B-Hillsdale WB prt 2, 2 , 2 , 0 , 0  
 6557.6,7766.5,520,520,  
 6484.8,7766.9,517,517,  
 6407.8,7768.1,512,512,  
 6349.7,7767.4,508,508,  
 6259.7,7768.1,500,500,  
 6196.0,7766.9,496,496,  
 6115.8,7765.6,492,492,  
 6029.7,7765.7,488,488,  
 5961.8,7765.7,484,484,  
 5899.9,7765.7,480,480,  
 5830.0,7766.6,480,480,  
 B-Hillsdale WB prt 3, 3 , 2 , 0 , 0  
 5830.0,7766.6,480,480,  
 5757.0,7766,480,480,  
 5680.0,7766,480,480,  
 5621.9,7765.3,480,480,  
 5531.9,7766,480,480,  
 B-Vista Grande SB prt 1, 4 , 2 , 0 , 0  
 7238.1,9486.4,532,532,  
 7236.1,9395.9,532,532,  
 7234.0,9303.4,532,532,  
 7232.0,9209,532,532,  
 7232.0,9114.5,532,532,  
 7232.0,9005.9,532,532,  
 7230.0,8895.4,532,532,  
 7230.0,8790.8,532,532,  
 7228.0,8680.3,532,532,

7226.0,8577.8,532,532,  
B-Vista Grande SB prt 2, 5 , 2 , 0 ,0  
7226.0,8577.8,532,532,  
7222.0,8461.2,532,532,  
7221.9,8349.8,532,532,  
7215.4,8246.7,532,532,  
7213.8,8157,532,532,  
7213.8,8065.2,532,532,  
7211.7,7976.3,532,532,  
7210.4,7886.3,532,532,  
7209.0,7786.8,526.7,526.7,  
B-Wood Fence, 6 , 2 , 0 ,0  
6917.7,8397.1,546,546,  
6917.1,8305.3,548,548,  
6915.9,8229.4,544.6,544.6,  
6915.4,8158.9,543,543,  
6914.2,8093.7,542,542,  
6914.2,8014.3,540,540,  
6914.2,7945,536,536,  
6911.8,7870.9,528.3,528.3,  
6911.2,7789.2,528.3,528.3,  
R, 1 , 67 ,500  
6779.4,8018.9,547,R-1  
R, 2 , 67 ,500  
6649.9,8106.4,545,R-2  
R, 3 , 67 ,500  
6651.1,8247.8,545,R-3  
R, 4 , 67 ,500  
6745.8,8361.7,545,R-4  
R, 5 , 67 ,500  
6882.5,8235.8,545,R-5  
D, 4.5  
ALL,ALL  
K, .1  
ALL,1,2,3,4,5  
C,C



SOUND32 - RELEASE 07/30/91, MODIFIED 04/22/00

TITLE:  
Frances Knoll Existing Condition (Modeled)

1

BARRIER DATA  
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BAR ELE	0	1	BARRIER HEIGHTS					6	7	BAR ID	LENGTH	TYPE
1	-	0.*								B1 P1	70.9	
2	-	0.*								B1 P2	52.8	
3	-	0.*								B1 P3	69.2	
4	-	0.*								B1 P4	65.5	
5	-	0.*								B1 P5	80.3	
6	-	0.*								B1 P6	86.1	
7	-	0.*								B1 P7	67.8	
8	-	0.*								B1 P8	62.0	
9	-	0.*								B1 P9	71.3	
10	-	0.*								B2 P1	72.9	
11	-	0.*								B2 P2	77.2	
12	-	0.*								B2 P3	58.2	
13	-	0.*								B2 P4	90.4	
14	-	0.*								B2 P5	63.8	
15	-	0.*								B2 P6	80.3	
16	-	0.*								B2 P7	86.2	
17	-	0.*								B2 P8	68.0	
18	-	0.*								B2 P9	62.0	
19	-	0.*								B2 P10	69.9	
20	-	0.*								B3 P1	73.0	
21	-	0.*								B3 P2	77.0	
22	-	0.*								B3 P3	58.1	
23	-	0.*								B3 P4	90.0	
24	-	0.*								B4 P1	90.5	
25	-	0.*								B4 P2	92.5	
26	-	0.*								B4 P3	94.4	
27	-	0.*								B4 P4	94.5	
28	-	0.*								B4 P5	108.6	
29	-	0.*								B4 P6	110.5	
30	-	0.*								B4 P7	104.6	
31	-	0.*								B4 P8	110.5	
32	-	0.*								B4 P9	102.5	
33	-	0.*								B5 P1	116.7	
34	-	0.*								B5 P2	111.4	
35	-	0.*								B5 P3	103.3	
36	-	0.*								B5 P4	89.7	
37	-	0.*								B5 P5	91.8	
38	-	0.*								B5 P6	88.9	
39	-	0.*								B5 P7	90.0	
40	-	0.*								B5 P8	99.7	
41	-	0.*								B6 P1	91.8	

42	-	0.*	B6 P2	76.0
43	-	0.*	B6 P3	70.5
44	-	0.*	B6 P4	65.2
45	-	0.*	B6 P5	79.4
46	-	0.*	B6 P6	69.4
47	-	0.*	B6 P7	74.5
48	-	0.*	B6 P8	81.7

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          0   1   2   3   4   5   6   7
1
REC REC ID      DNL  PEOPLE  LEQ(CAL)
-----
  1 R-1          67.    500.   56.6
  2 R-2          67.    500.   54.4
  3 R-3          67.    500.   52.6
  4 R-4          67.    500.   52.0
  5 R-5          67.    500.   54.2
BARRIER HEIGHT INDEX FOR EACH BARRIER SECTION
  1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1
  1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
CORRESPONDING BARRIER HEIGHTS FOR EACH SECTION
  0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.
0.
  0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.

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**FRANCES KNOLL SUBDIVISION**

**SOUND32 PRINTOUTS**

**FUTURE 2030 CONDITIONS (WORST-CASE)**

**GROUND FLOOR**

Frances Knoll Future Build Condition (Ground Floor)- Roadway Buildout

T-Hillsdale WB prt 1, 1  
 315 , 55 , 33 , 55 , 2 , 55  
 T-Hillsdale WB prt 2, 2  
 315 , 55 , 33 , 55 , 2 , 55  
 T-Hillsdale WB prt 3, 3  
 315 , 55 , 33 , 55 , 2 , 55  
 T-Hillsdale EB prt 1, 4  
 315 , 55 , 33 , 55 , 2 , 55  
 T-Hillsdale EB prt 2, 5  
 315 , 55 , 33 , 55 , 2 , 55  
 T-Hillsdale EB prt 3, 6  
 315 , 55 , 33 , 55 , 2 , 55  
 T-Vista Grande NB prt 1, 7  
 270 , 45 , 28 , 45 , 2 , 45  
 T-Vista Grande NB prt 2, 8  
 270 , 45 , 28 , 45 , 2 , 45  
 T-Vista Grande NB prt 1, 9  
 270 , 45 , 28 , 45 , 2 , 45  
 T-Vista Grande NB prt 2, 10  
 270 , 45 , 28 , 45 , 2 , 45  
 T-Spinali NB, 11  
 6 , 25 , 0 , 25 , 0 , 25  
 T-Spinali SB, 12  
 6 , 25 , 0 , 25 , 0 , 25  
 L-Hillsdale WB prt 1, 1  
 N,7946.2,7758.3,528.6,  
 N,7849.0,7758.3,528.6,  
 N,7769.9,7756.7,528.6,  
 N,7700.6,7756.7,528.6,  
 N,7634.7,7756.7,528.6,  
 N,7557.3,7755.0,528.6,  
 N,7471.6,7755.0,528.6,  
 N,7400.7,7755.0,528.6,  
 N,7326.5,7751.7,528.6,  
 N,7249.1,7751.7,528.6,  
 N,7184.8,7753.4,526.0,  
 N,7113.9,7751.7,522.9,  
 N,7061.2,7751.7,521.1,  
 N,6992.0,7753.4,520.3,  
 N,6926.5,7753.4,520.3  
 N,6846.3,7750.7,522.0  
 L-Hillsdale WB prt 2, 2  
 N,6846.3,7750.7,522.0  
 N,6760.2,7750.1,522.6  
 N,6691.8,7749.4,522.9  
 N,6629.9,7749.4,522.0  
 N,6559.0,7749.8,520.0  
 N,6486.2,7750.3,517.0  
 N,6409.2,7751.4,512.0  
 N,6351.2,7750.7,508.0  
 N,6261.2,7751.4,500.0  
 N,6197.4,7750.2,496.0  
 N,6117.2,7748.9,492.0  
 N,6031.1,7749.0,488.0  
 N,5963.3,7749.0,484.0  
 N,5901.3,7749.0,480.0  
 N,5831.5,7750.0,480.0  
 N,5758.4,7749.3,480.0,  
 L-Hillsdale WB prt 3, 3

N,5758.4,7749.3,480.0,  
 N,5681.4,7749.3,480.0,  
 N,5623.4,7748.7,480.0,  
 N,5533.4,7749.3,480.0,  
 L-Hillsdale EB prt 1, 4  
 N,7946.0,7728.2,528.6,  
 N,7848.7,7728.2,528.6,  
 N,7769.6,7726.6,528.6,  
 N,7700.4,7726.6,528.6,  
 N,7634.5,7726.6,528.6,  
 N,7557.0,7725.0,528.6,  
 N,7471.3,7725.0,528.6,  
 N,7400.4,7725.0,528.6,  
 N,7326.3,7721.7,528.6,  
 N,7248.8,7721.7,528.6,  
 N,7184.5,7723.3,526.0  
 N,7113.7,7721.7,522.9  
 N,7060.9,7721.7,521.1  
 N,6991.7,7723.4,520.3  
 N,6926.2,7723.3,520.3  
 N,6846.0,7720.7,522.0  
 L-Hillsdale EB prt 2, 5  
 N,6846.0,7720.7,522.0  
 N,6759.9,7720.1,522.6  
 N,6692.1,7719.4,522.9  
 N,6630.1,7719.4,522.0  
 N,6558.8,7719.8,520.0  
 N,6485.9,7720.2,517.0  
 N,6409.0,7721.3,512.0  
 N,6350.9,7720.7,508.0  
 N,6260.9,7721.3,500.0  
 N,6197.2,7720.2,496.0  
 N,6117.0,7718.9,492.0  
 N,6030.9,7719.0,488.0  
 N,5963.0,7719.0,484.0  
 N,5901.1,7719.0,480.0  
 N,5831.2,7719.9,480.0  
 N,5758.2,7719.3,480.0  
 L-Hillsdale EB prt 3, 6  
 N,5758.2,7719.3,480.0  
 N,5681.2,7719.3,480.0  
 N,5623.1,7718.6,480.0  
 N,5533.1,7719.3,480.0  
 L-Vista Grande NB prt 1, 7  
 N,7278.4,9485.8,532,  
 N,7276.4,9395.3,532,  
 N,7274.4,9302.9,532,  
 N,7272.4,9208.4,532,  
 N,7272.4,9113.9,532,  
 N,7272.4,9005.4,532,  
 N,7270.4,8894.8,532,  
 N,7270.4,8790.3,532,  
 N,7268.4,8679.7,532,  
 N,7266.3,8577.2,532,  
 N,7262.3,8460.6,532,  
 N,7261.2,8349.3,532,  
 N,7260.0,8246.7,532,  
 N,7258.3,8157,532,  
 N,7258.3,8065.2,532,  
 L-Vista Grande NB prt 2, 8

N,7258.3,8065.2,532,  
 N,7256.3,7976.3,532,  
 N,7254.9,7886.3,532,  
 N,7253.6,7786.8,526.7,  
 L-Vista Grande SB prt 1, 9  
 N,7248.6,9486.4,532,  
 N,7246.6,9395.9,532,  
 N,7244.6,9303.4,532,  
 N,7242.6,9209,532,  
 N,7242.6,9114.5,532,  
 N,7242.6,9005.9,532,  
 N,7240.6,8895.4,532,  
 N,7240.6,8790.8,532,  
 N,7238.6,8680.3,532,  
 N,7236.6,8577.8,532,  
 N,7232.6,8461.2,532,  
 N,7232.4,8349.8,532,  
 N,7226.0,8246.7,532,  
 N,7224.3,8157,532,  
 N,7224.3,8065.2,532,  
 L-Vista Grande SB prt 2, 10  
 N,7224.3,8065.2,532,  
 N,7222.3,7976.3,532,  
 N,7220.9,7886.3,532,  
 N,7219.6,7786.8,526.7,  
 L-Spinali NB,11  
 N,6833.2,7793.6,522.0,  
 N,6834.4,7826.5,526.0,  
 N,6849.9,7871.9,532.0,  
 N,6863.7,7909.8,536.0,  
 N,6882.4,7962.6,539.5,  
 N,6893.5,8002.8,540.5,  
 N,6893.5,8040.0,541.0,  
 N,6877.9,8081.0,541.5,  
 N,6845.1,8117.4,542.0,  
 N,6810.9,8145.0,542.0,  
 L-Spinali SB,12  
 N,6819.4,7793.2,522.0,  
 N,6821.7,7828.2,526.0,  
 N,6836.5,7874.0,532.0,  
 N,6850.0,7912.1,536.0,  
 N,6869.7,7967.1,539.5,  
 N,6882.1,8003.9,540.5,  
 N,6881.2,8037.8,541.0,  
 N,6868.9,8074.5,541.5,  
 N,6838.3,8107.9,542.0,  
 N,6804.0,8135.4,542.0,  
 B-Hillsdale WB prt 1, 1 , 2 , 0 , 0  
 7183.3,7770,526,526,  
 7112.5,7768.4,522.9,522.9,  
 7059.7,7768.4,521.1,521.1,  
 6990.5,7770.1,520.3,520.3,  
 6925.0,7770,520.3,520.3,  
 6844.8,7767.4,522,522,  
 6758.7,7766.8,522.6,522.6,  
 6690.9,7766.1,522.9,522.9,  
 6628.9,7766.1,522,522,  
 6557.6,7766.5,520,520,  
 B-Hillsdale WB prt 2, 2 , 2 , 0 , 0  
 6557.6,7766.5,520,520,

6484.8,7766.9,517,517,  
 6407.8,7768.1,512,512,  
 6349.7,7767.4,508,508,  
 6259.7,7768.1,500,500,  
 6196.0,7766.9,496,496,  
 6115.8,7765.6,492,492,  
 6029.7,7765.7,488,488,  
 5961.8,7765.7,484,484,  
 5899.9,7765.7,480,480,  
 5830.0,7766.6,480,480,  
 B-Hillsdale WB prt 3, 3 , 2 , 0 , 0  
 5830.0,7766.6,480,480,  
 5757.0,7766,480,480,  
 5680.0,7766,480,480,  
 5621.9,7765.3,480,480,  
 5531.9,7766,480,480,  
 B-Vista Grande SB prt 1, 4 , 2 , 0 , 0  
 7238.1,9486.4,532,532,  
 7236.1,9395.9,532,532,  
 7234.0,9303.4,532,532,  
 7232.0,9209,532,532,  
 7232.0,9114.5,532,532,  
 7232.0,9005.9,532,532,  
 7230.0,8895.4,532,532,  
 7230.0,8790.8,532,532,  
 7228.0,8680.3,532,532,  
 7226.0,8577.8,532,532,  
 B-Vista Grande SB prt 2, 5 , 2 , 0 , 0  
 7226.0,8577.8,532,532,  
 7222.0,8461.2,532,532,  
 7221.9,8349.8,532,532,  
 7215.4,8246.7,532,532,  
 7213.8,8157,532,532,  
 7213.8,8065.2,532,532,  
 7211.7,7976.3,532,532,  
 7210.4,7886.3,532,532,  
 7209.0,7786.8,526.7,526.7,  
 B-Spinali NB,6,2,0,0  
 6837.3,7793.9,522.0,522.0,  
 6840.3,7825.7,526.0,526.0,  
 6854.9,7870.5,532.0,532.0,  
 6869.1,7908.9,536.0,536.0,  
 6886.3,7961.1,539.5,539.5,  
 6898.7,8002.6,540.5,540.5,  
 6899.2,8040.9,541.0,541.0,  
 6882.7,8085.2,541.5,541.5,  
 6848.8,8123.2,542.0,542.0,  
 6814.6,8150.8,542.0,542.0,  
 B-Spinali SB,7,2,0,0  
 6814.5,7792.6,522.0,522.0,  
 6816.3,7828.9,526.0,526.0,  
 6831.5,7875.2,532.0,532.0,  
 6845.2,7913.0,536.0,536.0,  
 6865.7,7968.3,539.5,539.5,  
 6876.7,8004.1,540.5,540.5,  
 6876.5,8037.0,541.0,541.0,  
 6865.1,8071.5,541.5,541.5,  
 6835.1,8103.2,542.0,542.0,  
 6800.9,8130.7,542.0,542.0,  
 B-Wood Fence, 8 , 2 , 0 , 0

6917.7,8397.1,546,546,  
6917.1,8305.3,548,548,  
6915.9,8229.4,544.6,544.6,  
6915.4,8158.9,543,543,  
6914.2,8093.7,542,542,  
6914.2,8014.3,540,540,  
6914.2,7945,536,536,  
6911.8,7870.9,528.3,528.3,  
6911.2,7789.2,528.3,528.3,  
R, 1 , 67 ,500  
6779.4,8018.9,547,R-1  
R, 2 , 67 ,500  
6649.9,8106.4,545,R-2  
R, 3 , 67 ,500  
6651.1,8247.8,545,R-3  
R, 4 , 67 ,500  
6745.8,8361.7,545,R-4  
R, 5 , 67 ,500  
6882.5,8235.8,545,R-5  
D, 4.5  
ALL,ALL  
K,-.1  
ALL,1,2,3,4,5  
C,C



SOUND32 - RELEASE 07/30/91, MODIFIED 04/22/00

TITLE:

Frances Knoll Future Build Condition (Ground Floor)- Roadway Buildout

1

BARRIER DATA  
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BAR ELE	0	1	BARRIER HEIGHTS							BAR ID	LENGTH	TYPE
			2	3	4	5	6	7				
1	-	0.*							B1 P1	70.9		
2	-	0.*							B1 P2	52.8		
3	-	0.*							B1 P3	69.2		
4	-	0.*							B1 P4	65.5		
5	-	0.*							B1 P5	80.3		
6	-	0.*							B1 P6	86.1		
7	-	0.*							B1 P7	67.8		
8	-	0.*							B1 P8	62.0		
9	-	0.*							B1 P9	71.3		
10	-	0.*							B2 P1	72.9		
11	-	0.*							B2 P2	77.2		
12	-	0.*							B2 P3	58.2		
13	-	0.*							B2 P4	90.4		
14	-	0.*							B2 P5	63.8		
15	-	0.*							B2 P6	80.3		
16	-	0.*							B2 P7	86.2		
17	-	0.*							B2 P8	68.0		
18	-	0.*							B2 P9	62.0		
19	-	0.*							B2 P10	69.9		
20	-	0.*							B3 P1	73.0		
21	-	0.*							B3 P2	77.0		
22	-	0.*							B3 P3	58.1		
23	-	0.*							B3 P4	90.0		
24	-	0.*							B4 P1	90.5		
25	-	0.*							B4 P2	92.5		
26	-	0.*							B4 P3	94.4		
27	-	0.*							B4 P4	94.5		
28	-	0.*							B4 P5	108.6		
29	-	0.*							B4 P6	110.5		
30	-	0.*							B4 P7	104.6		
31	-	0.*							B4 P8	110.5		
32	-	0.*							B4 P9	102.5		
33	-	0.*							B5 P1	116.7		
34	-	0.*							B5 P2	111.4		
35	-	0.*							B5 P3	103.3		
36	-	0.*							B5 P4	89.7		
37	-	0.*							B5 P5	91.8		
38	-	0.*							B5 P6	88.9		
39	-	0.*							B5 P7	90.0		
40	-	0.*							B5 P8	99.7		
41	-	0.*							B6 P1	32.2		

42	-	0.*	B6 P2	47.5
43	-	0.*	B6 P3	41.1
44	-	0.*	B6 P4	55.1
45	-	0.*	B6 P5	43.3
46	-	0.*	B6 P6	38.3
47	-	0.*	B6 P7	47.3
48	-	0.*	B6 P8	50.9
49	-	0.*	B6 P9	43.9
50	-	0.*	B7 P1	36.6
51	-	0.*	B7 P2	49.1
52	-	0.*	B7 P3	40.4
53	-	0.*	B7 P4	59.1
54	-	0.*	B7 P5	37.5
55	-	0.*	B7 P6	32.9
56	-	0.*	B7 P7	36.3
57	-	0.*	B7 P8	43.6
58	-	0.*	B7 P9	43.9
59	-	0.*	B8 P1	91.8
60	-	0.*	B8 P2	76.0
61	-	0.*	B8 P3	70.5
62	-	0.*	B8 P4	65.2
63	-	0.*	B8 P5	79.4
64	-	0.*	B8 P6	69.4
65	-	0.*	B8 P7	74.5
66	-	0.*	B8 P8	81.7

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          0   1   2   3   4   5   6   7
1
REC REC ID      DNL  PEOPLE  LEQ(CAL)
-----
1  1 R-1        67.   500.   57.6
2  2 R-2        67.   500.   55.5
3  3 R-3        67.   500.   53.6
4  4 R-4        67.   500.   53.0
5  5 R-5        67.   500.   55.1
BARRIER HEIGHT INDEX FOR EACH BARRIER SECTION
1  1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1  1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1  1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
CORRESPONDING BARRIER HEIGHTS FOR EACH SECTION
0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.
0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.
0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.
0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.

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**FRANCES KNOLL SUBDIVISION**

**SOUND32 PRINTOUTS**

**FUTURE 2030 CONDITIONS (WORST-CASE)**

**SECOND FLOOR**

Frances Knoll Future Build Condition (2nd Floor)- Road Buildout

T-Hillsdale WB prt 1, 1  
 315 , 55 , 33 , 55 , 2 , 55  
 T-Hillsdale WB prt 2, 2  
 315 , 55 , 33 , 55 , 2 , 55  
 T-Hillsdale WB prt 3, 3  
 315 , 55 , 33 , 55 , 2 , 55  
 T-Hillsdale EB prt 1, 4  
 315 , 55 , 33 , 55 , 2 , 55  
 T-Hillsdale EB prt 2, 5  
 315 , 55 , 33 , 55 , 2 , 55  
 T-Hillsdale EB prt 3, 6  
 315 , 55 , 33 , 55 , 2 , 55  
 T-Vista Grande NB prt 1, 7  
 270 , 45 , 28 , 45 , 2 , 45  
 T-Vista Grande NB prt 2, 8  
 270 , 45 , 28 , 45 , 2 , 45  
 T-Vista Grande NB prt 1, 9  
 270 , 45 , 28 , 45 , 2 , 45  
 T-Vista Grande NB prt 2, 10  
 270 , 45 , 28 , 45 , 2 , 45  
 T-Spinali NB, 11  
 6 , 25 , 0 , 25 , 0 , 25  
 T-Spinali SB, 12  
 6 , 25 , 0 , 25 , 0 , 25  
 L-Hillsdale WB prt 1, 1  
 N,7946.2,7758.3,528.6,  
 N,7849.0,7758.3,528.6,  
 N,7769.9,7756.7,528.6,  
 N,7700.6,7756.7,528.6,  
 N,7634.7,7756.7,528.6,  
 N,7557.3,7755.0,528.6,  
 N,7471.6,7755.0,528.6,  
 N,7400.7,7755.0,528.6,  
 N,7326.5,7751.7,528.6,  
 N,7249.1,7751.7,528.6,  
 N,7184.8,7753.4,526.0,  
 N,7113.9,7751.7,522.9,  
 N,7061.2,7751.7,521.1,  
 N,6992.0,7753.4,520.3,  
 N,6926.5,7753.4,520.3  
 N,6846.3,7750.7,522.0  
 L-Hillsdale WB prt 2, 2  
 N,6846.3,7750.7,522.0  
 N,6760.2,7750.1,522.6  
 N,6691.8,7749.4,522.9  
 N,6629.9,7749.4,522.0  
 N,6559.0,7749.8,520.0  
 N,6486.2,7750.3,517.0  
 N,6409.2,7751.4,512.0  
 N,6351.2,7750.7,508.0  
 N,6261.2,7751.4,500.0  
 N,6197.4,7750.2,496.0  
 N,6117.2,7748.9,492.0  
 N,6031.1,7749.0,488.0  
 N,5963.3,7749.0,484.0  
 N,5901.3,7749.0,480.0  
 N,5831.5,7750.0,480.0  
 N,5758.4,7749.3,480.0,  
 L-Hillsdale WB prt 3, 3

N,5758.4,7749.3,480.0,  
 N,5681.4,7749.3,480.0,  
 N,5623.4,7748.7,480.0,  
 N,5533.4,7749.3,480.0,  
 L-Hillsdale EB prt 1, 4  
 N,7946.0,7728.2,528.6,  
 N,7848.7,7728.2,528.6,  
 N,7769.6,7726.6,528.6,  
 N,7700.4,7726.6,528.6,  
 N,7634.5,7726.6,528.6,  
 N,7557.0,7725.0,528.6,  
 N,7471.3,7725.0,528.6,  
 N,7400.4,7725.0,528.6,  
 N,7326.3,7721.7,528.6,  
 N,7248.8,7721.7,528.6,  
 N,7184.5,7723.3,526.0,  
 N,7113.7,7721.7,522.9,  
 N,7060.9,7721.7,521.1,  
 N,6991.7,7723.4,520.3,  
 N,6926.2,7723.3,520.3,  
 N,6846.0,7720.7,522.0  
 L-Hillsdale EB prt 2, 5  
 N,6846.0,7720.7,522.0  
 N,6759.9,7720.1,522.6  
 N,6692.1,7719.4,522.9  
 N,6630.1,7719.4,522.0  
 N,6558.8,7719.8,520.0  
 N,6485.9,7720.2,517.0  
 N,6409.0,7721.3,512.0  
 N,6350.9,7720.7,508.0  
 N,6260.9,7721.3,500.0  
 N,6197.2,7720.2,496.0  
 N,6117.0,7718.9,492.0  
 N,6030.9,7719.0,488.0  
 N,5963.0,7719.0,484.0  
 N,5901.1,7719.0,480.0  
 N,5831.2,7719.9,480.0  
 N,5758.2,7719.3,480.0  
 L-Hillsdale EB prt 3, 6  
 N,5758.2,7719.3,480.0  
 N,5681.2,7719.3,480.0  
 N,5623.1,7718.6,480.0  
 N,5533.1,7719.3,480.0  
 L-Vista Grande NB prt 1, 7  
 N,7278.4,9485.8,532,  
 N,7276.4,9395.3,532,  
 N,7274.4,9302.9,532,  
 N,7272.4,9208.4,532,  
 N,7272.4,9113.9,532,  
 N,7272.4,9005.4,532,  
 N,7270.4,8894.8,532,  
 N,7270.4,8790.3,532,  
 N,7268.4,8679.7,532,  
 N,7266.3,8577.2,532,  
 N,7262.3,8460.6,532,  
 N,7261.2,8349.3,532,  
 N,7260.0,8246.7,532,  
 N,7258.3,8157.532,  
 N,7258.3,8065.2,532,  
 L-Vista Grande NB prt 2, 8

N,7258.3,8065.2,532,  
 N,7256.3,7976.3,532,  
 N,7254.9,7886.3,532,  
 N,7253.6,7786.8,526.7,  
 L-Vista Grande SB prt 1, 9  
 N,7248.6,9486.4,532,  
 N,7246.6,9395.9,532,  
 N,7244.6,9303.4,532,  
 N,7242.6,9209,532,  
 N,7242.6,9114.5,532,  
 N,7242.6,9005.9,532,  
 N,7240.6,8895.4,532,  
 N,7240.6,8790.8,532,  
 N,7238.6,8680.3,532,  
 N,7236.6,8577.8,532,  
 N,7232.6,8461.2,532,  
 N,7232.4,8349.8,532,  
 N,7226.0,8246.7,532,  
 N,7224.3,8157,532,  
 N,7224.3,8065.2,532,  
 L-Vista Grande SB prt 2, 10  
 N,7224.3,8065.2,532,  
 N,7222.3,7976.3,532,  
 N,7220.9,7886.3,532,  
 N,7219.6,7786.8,526.7,  
 L-Spinali NB,11  
 N,6833.2,7793.6,522.0,  
 N,6834.4,7826.5,526.0,  
 N,6849.9,7871.9,532.0,  
 N,6863.7,7909.8,536.0,  
 N,6882.4,7962.6,539.5,  
 N,6893.5,8002.8,540.5,  
 N,6893.5,8040.0,541.0,  
 N,6877.9,8081.0,541.5,  
 N,6845.1,8117.4,542.0,  
 N,6810.9,8145.0,542.0,  
 L-Spinali SB,12  
 N,6819.4,7793.2,522.0,  
 N,6821.7,7828.2,526.0,  
 N,6836.5,7874.0,532.0,  
 N,6850.0,7912.1,536.0,  
 N,6869.7,7967.1,539.5,  
 N,6882.1,8003.9,540.5,  
 N,6881.2,8037.8,541.0,  
 N,6868.9,8074.5,541.5,  
 N,6838.3,8107.9,542.0,  
 N,6804.0,8135.4,542.0,  
 B-Hillsdale WB prt 1, 1 , 2 , 0 , 0  
 7183.3,7770,526,526,  
 7112.5,7768.4,522.9,522.9,  
 7059.7,7768.4,521.1,521.1,  
 6990.5,7770.1,520.3,520.3,  
 6925.0,7770,520.3,520.3,  
 6844.8,7767.4,522,522,  
 6758.7,7766.8,522.6,522.6,  
 6690.9,7766.1,522.9,522.9,  
 6628.9,7766.1,522,522,  
 6557.6,7766.5,520,520,  
 B-Hillsdale WB prt 2, 2 , 2 , 0 , 0  
 6557.6,7766.5,520,520,

6484.8,7766.9,517,517,  
 6407.8,7768.1,512,512,  
 6349.7,7767.4,508,508,  
 6259.7,7768.1,500,500,  
 6196.0,7766.9,496,496,  
 6115.8,7765.6,492,492,  
 6029.7,7765.7,488,488,  
 5961.8,7765.7,484,484,  
 5899.9,7765.7,480,480,  
 5830.0,7766.6,480,480,  
 B-Hillsdale WB prt 3, 3 , 2 , 0 , 0  
 5830.0,7766.6,480,480,  
 5757.0,7766,480,480,  
 5680.0,7766,480,480,  
 5621.9,7765.3,480,480,  
 5531.9,7766,480,480,  
 B-Vista Grande SB prt 1, 4 , 2 , 0 , 0  
 7238.1,9486.4,532,532,  
 7236.1,9395.9,532,532,  
 7234.0,9303.4,532,532,  
 7232.0,9209,532,532,  
 7232.0,9114.5,532,532,  
 7232.0,9005.9,532,532,  
 7230.0,8895.4,532,532,  
 7230.0,8790.8,532,532,  
 7228.0,8680.3,532,532,  
 7226.0,8577.8,532,532,  
 B-Vista Grande SB prt 2, 5 , 2 , 0 , 0  
 7226.0,8577.8,532,532,  
 7222.0,8461.2,532,532,  
 7221.9,8349.8,532,532,  
 7215.4,8246.7,532,532,  
 7213.8,8157,532,532,  
 7213.8,8065.2,532,532,  
 7211.7,7976.3,532,532,  
 7210.4,7886.3,532,532,  
 7209.0,7786.8,526.7,526.7,  
 B-Spinali NB,6,2,0,0  
 6837.3,7793.9,522.0,522.0,  
 6840.3,7825.7,526.0,526.0,  
 6854.9,7870.5,532.0,532.0,  
 6869.1,7908.9,536.0,536.0,  
 6886.3,7961.1,539.5,539.5,  
 6898.7,8002.6,540.5,540.5,  
 6899.2,8040.9,541.0,541.0,  
 6882.7,8085.2,541.5,541.5,  
 6848.8,8123.2,542.0,542.0,  
 6814.6,8150.8,542.0,542.0,  
 B-Spinali SB,7,2,0,0  
 6814.5,7792.6,522.0,522.0,  
 6816.3,7828.9,526.0,526.0,  
 6831.5,7875.2,532.0,532.0,  
 6845.2,7913.0,536.0,536.0,  
 6865.7,7968.3,539.5,539.5,  
 6876.7,8004.1,540.5,540.5,  
 6876.5,8037.0,541.0,541.0,  
 6865.1,8071.5,541.5,541.5,  
 6835.1,8103.2,542.0,542.0,  
 6800.9,8130.7,542.0,542.0,  
 B-Wood Fence, 8 , 2 , 0 , 0

6917.7,8397.1,546,546,  
6917.1,8305.3,548,548,  
6915.9,8229.4,544.6,544.6,  
6915.4,8158.9,543,543,  
6914.2,8093.7,542,542,  
6914.2,8014.3,540,540,  
6914.2,7945,536,536,  
6911.8,7870.9,528.3,528.3,  
6911.2,7789.2,528.3,528.3,  
R, 1 , 67 ,500  
6779.4,8018.9,556.0,R-1  
R, 2 , 67 ,500  
6649.9,8106.4,554.0,R-2  
R, 3 , 67 ,500  
6651.1,8247.8,554.0,R-3  
R, 4 , 67 ,500  
6745.8,8361.7,554.0,R-4  
R, 5 , 67 ,500  
6882.5,8235.8,554.0,R-5  
D, 3.5  
ALL,ALL  
K,-.1  
ALL,1,2,3,4,5  
C,C



SOUND32 - RELEASE 07/30/91, MODIFIED 04/22/00

TITLE:

Frances Knoll Future Build Condition (2nd Floor)- Road Buildout

1

BARRIER DATA  
\*\*\*\*\*

BAR ELE	0	1	BARRIER HEIGHTS					6	7	BAR ID	LENGTH	TYPE
1	-	0.*								B1 P1	70.9	
2	-	0.*								B1 P2	52.8	
3	-	0.*								B1 P3	69.2	
4	-	0.*								B1 P4	65.5	
5	-	0.*								B1 P5	80.3	
6	-	0.*								B1 P6	86.1	
7	-	0.*								B1 P7	67.8	
8	-	0.*								B1 P8	62.0	
9	-	0.*								B1 P9	71.3	
10	-	0.*								B2 P1	72.9	
11	-	0.*								B2 P2	77.2	
12	-	0.*								B2 P3	58.2	
13	-	0.*								B2 P4	90.4	
14	-	0.*								B2 P5	63.8	
15	-	0.*								B2 P6	80.3	
16	-	0.*								B2 P7	86.2	
17	-	0.*								B2 P8	68.0	
18	-	0.*								B2 P9	62.0	
19	-	0.*								B2 P10	69.9	
20	-	0.*								B3 P1	73.0	
21	-	0.*								B3 P2	77.0	
22	-	0.*								B3 P3	58.1	
23	-	0.*								B3 P4	90.0	
24	-	0.*								B4 P1	90.5	
25	-	0.*								B4 P2	92.5	
26	-	0.*								B4 P3	94.4	
27	-	0.*								B4 P4	94.5	
28	-	0.*								B4 P5	108.6	
29	-	0.*								B4 P6	110.5	
30	-	0.*								B4 P7	104.6	
31	-	0.*								B4 P8	110.5	
32	-	0.*								B4 P9	102.5	
33	-	0.*								B5 P1	116.7	
34	-	0.*								B5 P2	111.4	
35	-	0.*								B5 P3	103.3	
36	-	0.*								B5 P4	89.7	
37	-	0.*								B5 P5	91.8	
38	-	0.*								B5 P6	88.9	
39	-	0.*								B5 P7	90.0	
40	-	0.*								B5 P8	99.7	
41	-	0.*								B6 P1	32.2	

42	-	0.*		
43	-	0.*	B6 P2	47.5
44	-	0.*	B6 P3	41.1
45	-	0.*	B6 P4	55.1
46	-	0.*	B6 P5	43.3
47	-	0.*	B6 P6	38.3
48	-	0.*	B6 P7	47.3
49	-	0.*	B6 P8	50.9
			B6 P9	43.9
50	-	0.*		
51	-	0.*	B7 P1	36.6
52	-	0.*	B7 P2	49.1
53	-	0.*	B7 P3	40.4
54	-	0.*	B7 P4	59.1
55	-	0.*	B7 P5	37.5
56	-	0.*	B7 P6	32.9
57	-	0.*	B7 P7	36.3
58	-	0.*	B7 P8	43.6
			B7 P9	43.9
59	-	0.*		
60	-	0.*	B8 P1	91.8
61	-	0.*	B8 P2	76.0
62	-	0.*	B8 P3	70.5
63	-	0.*	B8 P4	65.2
64	-	0.*	B8 P5	79.4
65	-	0.*	B8 P6	69.4
66	-	0.*	B8 P7	74.5
			B8 P8	81.7

```

-----
      0      1      2      3      4      5      6      7
1
REC REC ID      DNL  PEOPLE  LEQ(CAL)
-----
1  R-1          67.    500.   60.0
2  R-2          67.    500.   57.4
3  R-3          67.    500.   55.5
4  R-4          67.    500.   55.1
5  R-5          67.    500.   57.6
BARRIER HEIGHT INDEX FOR EACH BARRIER SECTION
1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1  1
CORRESPONDING BARRIER HEIGHTS FOR EACH SECTION
0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.
0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.
0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.
0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.

```

## **APPENDIX B**

### **FHWA HIGHWAY TRAFFIC NOISE MODEL PRINTOUTS**

TABLE 1  
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 8/1/2007  
ROADWAY SEGMENT: HILLSDALE ROAD  
NOTES: 2030

---

\* \* ASSUMPTIONS \* \*

AVERAGE DAILY TRAFFIC: 7000      SPEED (MPH): 55      GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

DAY	EVENING	NIGHT
---	-----	-----

AUTOS	69.76	11.61	8.63
M-TRUCKS	7.63	0.44	0.93
H-TRUCKS	0.86	0.03	0.11

ACTIVE HALF-WIDTH (FT): 24      SITE CHARACTERISTICS: SOFT

---

\* \* CALCULATED NOISE LEVELS \* \*

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 67.99

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL			
70 CNEL	65 CNEL	60 CNEL	55 CNEL
-----	-----	-----	-----
56.7	113.3	239.7	514.4

---

TABLE 2  
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 8/1/2007  
ROADWAY SEGMENT: VISTA GRANDE ROAD  
NOTES: 2030

---

\* \* ASSUMPTIONS \* \*

AVERAGE DAILY TRAFFIC: 6000      SPEED (MPH): 45      GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY ---	EVENING -----	NIGHT -----
AUTOS	69.76	11.61	8.63
M-TRUCKS	7.63	0.44	0.93
H-TRUCKS	0.86	0.03	0.11

ACTIVE HALF-WIDTH (FT): 24      SITE CHARACTERISTICS: SOFT

---

\* \* CALCULATED NOISE LEVELS \* \*

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 65.21

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL			
70 CNEL -----	65 CNEL -----	60 CNEL -----	55 CNEL -----
0.0	76.1	157.5	336.0

---

TABLE 1  
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 8/1/2007  
ROADWAY SEGMENT: HILLSDALE ROAD  
NOTES: 2030

---

\* \* ASSUMPTIONS \* \*

AVERAGE DAILY TRAFFIC: 7000      SPEED (MPH): 55      GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

DAY	EVENING	NIGHT
---	-----	-----

AUTOS	69.76	11.61	8.63
M-TRUCKS	7.63	0.44	0.93
H-TRUCKS	0.86	0.03	0.11

ACTIVE HALF-WIDTH (FT): 24      SITE CHARACTERISTICS: HARD

---

\* \* CALCULATED NOISE LEVELS \* \*

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 68.76

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
-----	-----	-----	-----
57.8	167.9	526.0	1661.7

---

TABLE 2  
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 8/1/2007  
ROADWAY SEGMENT: VISTA GRANDE ROAD  
NOTES: 2030

---

\* \* ASSUMPTIONS \* \*

AVERAGE DAILY TRAFFIC: 6000      SPEED (MPH): 45      GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

DAY	EVENING	NIGHT
---	-----	-----

AUTOS	69.76	11.61	8.63
M-TRUCKS	7.63	0.44	0.93
H-TRUCKS	0.86	0.03	0.11

ACTIVE HALF-WIDTH (FT): 24      SITE CHARACTERISTICS: HARD

---

\* \* CALCULATED NOISE LEVELS \* \*

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 65.97

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
-----	-----	-----	-----
0.0	90.8	277.8	875.6

---